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(54) Safety signalling system for communication paths.

(57) A safety signalling system for communication paths able to prevent the extinguishing of the entire signalling system when partial faults occur, wherein in a power line the light sources are connected to

series-arranged transformer systems with windings such as not to result in line interruptions or overloads, the light sources used being of various types according to the specific application of the system.

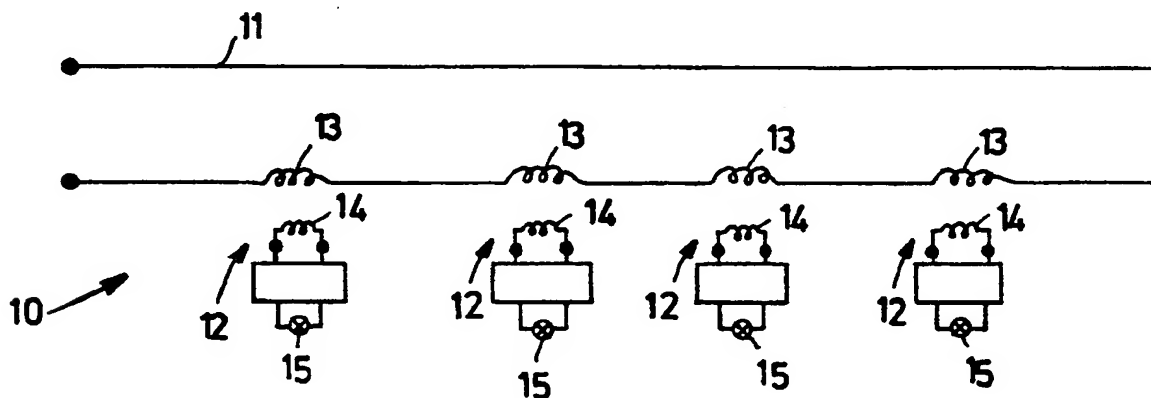


Fig.1

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This invention relates to a safety signalling system for communication paths.

In particular, the invention relates to systems able to provide light signalling for increasing the safety of vehicles moving along communication paths such as roads, highways, manoeuvring and parking areas, airports, runways and the like under conditions of reduced visibility due to atmospheric or accident phenomena. Various arrangements are known for powering a large number of differently indicating light sources positioned at increasing distances from the energy generator to solve safety problems relating to visibility along communication paths.

These arrangements generally vary in terms of the type of light source, the source emission colour, the intensity and time variation of such emission, and the method of powering the sources.

The greatest problems in current systems relate to the type of light source which in the case of an incandescent element has a limited life, influenced by the method of powering.

In the case of series powering, all the sources are traversed by the same current, resulting in the same light intensity for each of the sources, which are identical along the entire line, whatever their number and the size of the connection conductor. A drawback of the series arrangement is that because of the limited life of the light sources, any interruption in any source results in the extinguishing of the entire chain unless an automatic bypass device is provided across the terminals of each source to short the source and restore circuit continuity.

This automatic device has to be strong and very reliable, but in any event complicates the structure of the system, increases its cost and makes maintenance more difficult.

A further drawback of this arrangement is the need to install a current regulator at the power point, because when the bypass device operates the circuit current increases and has to be returned as rapidly as possible to the rated value.

The object of the present invention is to prevent the extinguishing of the entire chain when one source is interrupted, and also to ensure that such an event has negligible repercussion on the current through the chain.

This object is attained by a signalling system in which a plurality of light sources are provided along a power line and are connected to said line, characterised in that a transformer is provided in said line for each lighting point, said transformers being connected in series with said line, at least one light source being able to be associated with each lighting point. According to a preferred embodiment, in the secondary winding of each of said transformers there is provided a central tap to

which the common point of two series-connected light sources is connected.

Moreover, said central tap is provided with a resistor to compensate any voltage drop.

According to the invention said light sources are incandescent lamps.

Alternatively said light sources are light emitting diodes (LEDs). The characteristics and further advantages of the present invention will be more apparent from the description given hereinafter with reference to the accompanying drawing in which:

Figure 1 shows the schematic diagram of a system according to the invention; and

Figure 2 shows a preferred arrangement of a part of Figure 1.

In the figures the reference numeral 10 indicates overall the schematic diagram of a system according to the invention in which a series of transformers 12 are provided along a power line 11. The primary windings 13 and secondary windings 14 of these transformers are shown schematically. The light sources 15 are connected to the secondary windings 14. In a further preferred embodiment of the present invention shown in Figure 3, the secondary winding 14 of each of said transformers is provided with a central tap 16, to which the common point 17 of two light sources 18 and 19 is connected.

The central tap 16 is also provided with a resistor 20 to absorb any voltage drops.

This embodiment allows the line current to be determined at the design stage according to operational convenience, and enables any kind of light source to be fed with this current, provided the transformer is constructed with the correct characteristics for the particular light source.

When the most suitable type of light source for the particular case has been chosen, then knowing its voltage requirement and circulating current the voltage and current of the supply circuit can be determined on the basis of the total length and number of sources installed.

For the safety of the maintenance and traffic personnel it is often advisable to use a low operating voltage for the signalling system, this being easily attained by using transformers with a turn ratio such as to reduce the voltage drop across each source to a very small value.

It is true that this method results in an increased line current, but the supply voltage can be kept equally low by increasing the cross-sectional area of the line conductor in proportion.

These expedients enable the advantages of a current-controllable series circuit to be substantially obtained while maintaining a considerable freedom in the choice of supply voltage.

The light source used can be of either incandescent or LED type, the intrinsic differences

between these two types favouring the use of one or the other depending on the specific requirements of the system.

When the light source is an incandescent lamp with a filament which burns out after a certain number of hours, the consequent voltage increase across the primary can be limited by using a secondary winding 14 having a central tap 16 to which the common point 17 of two series-connected lamps 18 and 19 is connected (Figure 3).

The voltage drop across the resistor is practically zero under normal conditions, whereas when a lamp burns out the voltage drop assumes a value which compensates the unbalance.

Generally an incandescent lamp (typical power 10-20 watts) is the most suitable source for providing high intensity at particularly dangerous points.

The greater life of LEDs (one or more orders of magnitude) and their very small individual power (about 0.06 watts) favour their use in variable message indicator boards and pictograms comprising a large number of light points, or in small light points positioned very close together to indicate guard paths or lines. Their thermal inertia facilitates pulse-powering, even of just a few Hertz frequency.

If the light sources consist of a small number of light emitting diodes (LEDs) of very long life, breakdown of the device is very rare, however expedients to limit any voltage increase can still be used, such as Zener diodes or limiting resistors.

In conclusion, the advantage of the invention is that it provides a system in which the light sources are perfectly identical with regard to their light intensity, they are easily controlled by regulating the primary circuit current, and each source can be individually serviced without risk to the operator even with the system live, and with virtually no influence on the system performance.

The present invention has been described by way of non-limiting example, but modifications can be made thereto provided they fall within the scope of protection defined by the present document.

Claims

1. A signalling system in which a plurality of light sources are provided along a power line and are connected to said line, characterised in that a transformer is provided in said line for each lighting point, said transformers being connected in series with said line, at least one light source being able to be associated with each lighting point.
2. A signalling system as claimed in claim 1, characterised in that in the secondary winding of each of said transformers there is provided a central tap to which the common point of two

series-connected light sources is connected.

3. A signalling system as claimed in claim 2, characterised in that said central tap is provided with a resistor to compensate any voltage drop.
4. A signalling system as claimed in claim 1 or 2, characterised in that said light sources are incandescent lamps.
5. A signalling system as claimed in claim 1 or 2, characterised in that said light sources are light emitting diodes (LEDs).

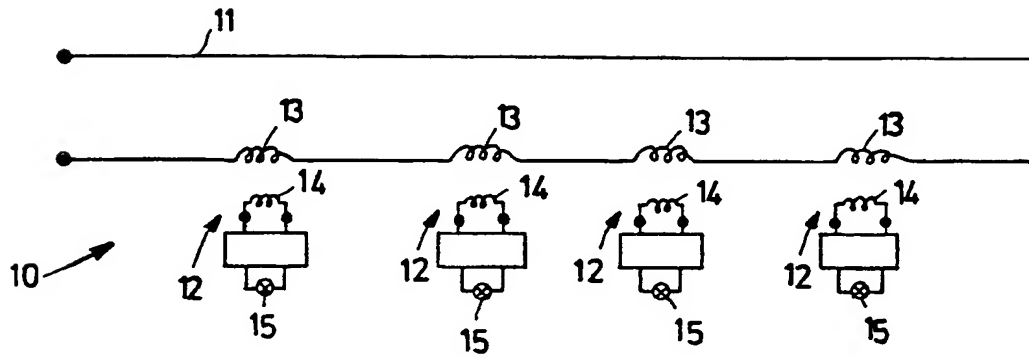


Fig. 1

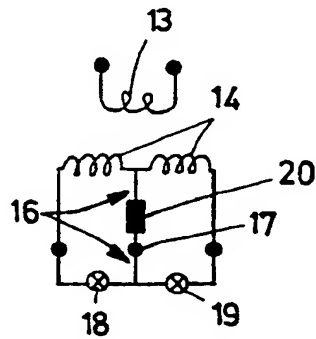


Fig. 2



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EUROPEAN SEARCH REPORT

Application Number

EP 91 20 0538

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int. Cl.5)
X,P	US-A-4 912 372 (MONGOVEN) * the whole document *	1,2,4	H 05 B 37/03 H 05 B 39/04
X,A	EP-A-0 301 528 (VITROSELENIA) * column 1, line 48 - column 1, line 53 * * column 5, line 37 - column 5, line 46 @ column 6, line 55 - column 7, line 13; figures 2, 3, 9 *	1,2,4	
			TECHNICAL FIELDS SEARCHED (Int. Cl.5)
			H 05 B
The present search report has been drawn up for all claims			
Place of search		Date of completion of search	Examiner
The Hague		16 July 91	SPEISER P.
<div>CATEGORY OF CITED DOCUMENTS</div> <div>X: particularly relevant if taken alone</div> <div>Y: particularly relevant if combined with another document of the same category</div> <div>A: technological background</div> <div>O: non-written disclosure</div> <div>P: intermediate document</div> <div>T: theory or principle underlying the invention</div> <div>E: earlier patent document, but published on, or after the filing date</div> <div>D: document cited in the application</div> <div>L: document cited for other reasons</div> <div>&: member of the same patent family, corresponding document</div>			